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LABORATORY SUBMISSION MANUAL

For British Columbia Veterinarians

February, 1992

Province of British Columbia
Ministry of Agriculture, Fisheries and Food
Animal Health Centre

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Laboratory Submission Manual

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Animal Health Centre
1874 Gladwin Road, Box 100
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V2S 4N8

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Introduction

The mandate of the Animal Health Branch of the British Columbia Ministry of Agriculture, Fisheries and Food is animal disease control in the province; the authority comes from the Animal Disease Control Act.

This mandate is accomplished by monitoring submissions to the Animal Health Centre (AHC), health programs, field investigations and other data. This monitoring provides information on disease trends so that appropriate action may be taken.

The Branch consists of four sections:

1) Animal Health Centre (Veterinary Laboratory) in Abbotsford;

2) Animal Health Management, including aquaculture, also at the AHC;

3) Brands Inspection and Regulatory Program (BIRP) in Kamloops;

4) Game Farming Program in Victoria.

The mandate of the AHC is to diagnose and monitor disease to ensure sustained animal health and more economic livestock production; this is largely accomplished by submissions received from veterinary practitioners.

The AHC is equipped to perform a very wide variety of tests in many disciplines to assist in the diagnosis of animal disease whether due to bacterial, viral, toxic agents or deficiency syndromes.

Any questions regarding a specific disease problem and types of specimens to be submitted to aid in diagnoses should be directed to the pathologists.

The Animal Health Monitoring Laboratory (AHML) is in a separate building adjacent to the AHC. The AHML performs tests of a monitoring nature primarily for the poultry industry; tests for other species are gradually being added. A list of tests done by the AHML will be found in this folder. ***Samples for the AHML should be submitted directly to that laboratory and the cheques should be made out to the Animal Health Monitoring Laboratory.***

The Animal Health Management section develops and runs, often with laboratory staff, specific health programs. Many of these programs receive considerable help from practitioners and livestock associations. This section is also involved in helping practitioners with in-depth investigations and epidemiology. The Fish Health Veterinarian runs the same type of programs for aquaculture.

The Brands Inspection and Regulatory Program (BIRP) is responsible for brand inspection, brand registration and the administration of many legislative Acts.

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The Animal Health Branch administers fourteen Acts and many licences are awarded under these Acts and Regulations; most are handled by the BIRP section.

The BIRP licences and bonds public saleyards and livestock dealers and licences auctioneers, yardmen, hide dealers and slaughterhouses. It keeps records of animal sales which enable the tracing of "in-contact" animals in disease control.

The Game Farming Program's mandate is to assist in the orderly development of game farming. Three species are approved for game farming: fallow deer, bison and reindeer. Reindeer farming is restricted to the Peace River area at this time.

Integration of each of these sections helps to maintain and improve the viability of the livestock industry in British Columbia.

Staff

Animal Health Branch

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Animal Health Centre
(Veterinary Laboratory)

General

The facility provides a specialized veterinary diagnostic service to veterinary practitioners, livestock owners, the general public and government agencies.

Laboratory staff are specialists in their field and are available for consultations by letter, telephone or personal contact. Where possible, they will provide the latest information from our library of books, journals or personal files.

Diagnosis and Reporting

As much relevant history as possible must be provided with the specimen to ensure this is taken into consideration in making the final diagnosis and recommendations.

The laboratory pathologists will report their findings, diagnoses and recommendations for control (if applicable), in a written report. Reports will be made only to the submitter or their designate. Other requests will require permission from the submitter.

Interpretation of Reports

In as many cases as possible, we try to report directly to the livestock owner's own veterinarian. The veterinarian usually knows the farmer, his level of management and the environmental conditions. It is most important that the practising veterinarian interpret the laboratory findings and report to the farmer, taking into account his knowledge of the farm.

Urgency

If a particular result is required urgently, please telephone the Animal Health Centre before submitting the specimen; discussion with the pathologist will often provide a lead or even solution to the case.

Preliminary results are available often within a day or two, sometimes less, by telephoning the laboratory. Where possible, pathologists phone out significant results. The fax machine will be used, where possible to speed up reporting.

Field Investigations

Where problem cases or persistent disease situations exist on a farm, personnel can be made available for consultation and visits to the farm. We prefer that these are made with the practising veterinarian involved.

Disposal of Animals

We are unable to accept animals for incineration. The licence granted for our incinerator does not permit the incineration of carcasses from outside agencies.

Notes

Animal Health Centre

Specimen Submission Guidelines and Section Overviews

Notes

Specimen Shipping Instructions

General

We reserve the right to discard unsatisfactory specimens

Shipping:

Ensure samples are shipped so they do not arrive on a weekend or a statutory holiday. All shipments must be prepaid.

1) Direct delivery - 8:30-12:00; 1:00-4:30, Monday - Friday
   Please deliver as early in the day as possible.
2) Post - collected by laboratory staff from post office. **Samples must be adequately packed so they do not leak*.** They must be well preserved so that they arrive in suitable condition for examination.
3) Bus - **samples must be adequately packed so they do not leak*.** Collected from Abbotsford Bus Depot by laboratory staff throughout the day.
4) Courier. Numerous companies deliver specimens directly to the AHC.

History

A **complete** history indicating the disease(s) suspected is essential for all submissions, including tumours and biopsies. Please enclose submission information in a separate plastic bag and pack it at top of box.

Diagnosis

Is based on the history provided and the results from the various sections in the laboratory. The Laboratory results must be coupled with conditions on the farm, such as management, nutrition, environmental conditions, etc. For best utilization of our service a complete history and good, well-preserved specimens should be submitted.

Preservation

a) Refrigeration: Use a styrofoam box, frozen picnic packs or balloons partly filled with water and frozen, and insulate well with newspaper, sawdust, etc. Protect and separate samples in leak-proof plastic bags.
b) Fresh Frozen: Tissue in a sterile container, frozen and shipped with ice packs.
c) Formalized: When requesting histopathology, submit tissues in formalin rather than fresh tissues. This will prevent autolysis while in transit.

Send several pieces of tissue no thicker than 3-5 mm; length and breadth can be several centimeters.

One part tissue to 10 times volume of 10% neutral buffered formalin (see attached recipe or consult AHC for buffering agents).

* *Specimens shipped frozen are often thawed by the time of arrival, and unless packed well, will leak.*

NOTE: Please do not freeze samples for which you may require histopathology.

Notes

Histopathology

Bacteriology

Toxicology

Virology

Notes

Histopathology

Whenever possible, fix tissues at the time of necropsy if histopathology is required. Transit time invariably results in tissue autolysis if specimens are sent in fresh; better to fix them prior to submission.

Freezing seriously impairs histopathological examination of specimens by causing extensive disruption of cellular structures. Always send fixed tissues rather than frozen, if histopathology is required.

Preparation of fixed tissue with formalin

Formalin will only penetrate approx. 3 mm in 24 hours, so specimens should be no thicker than 5 mm. Other dimensions are not critical but should be large enough to provide an adequate field of study. Ten volumes of buffered fixative to one volume of tissue is essential for adequate fixation.

If larger pieces of tissue, such as brain, are to be sent it is best to make some cuts so that formalin can penetrate more quickly. Once fixed, transportation to the Animal Health Centre using just enough formalin to cover the fixed tissue is adequate.

Select a section of tissue at the edge of the lesion to include some normal as well as diseased tissue.

We have included a recipe for 10% neutral buffered formalin. If this formulation is followed carefully, your fixed tissue preparations will be satisfactory. If formalin is not buffered, acid hematin (a blackish-brown pigment) forms from hemoglobin and can impair microscopic examination and obscure subtle tissue alterations.

The Animal Health Centre will be pleased to provide these buffering agents in a quantity sufficient to make up four litres of 10% neutral buffered formalin.

Recipe for 10% Neutral Buffered Formalin

Formalin 35-40% strength - 10 ml
(Na H2 PO4 H2O) Sodium phosphate monobasic monohydrate - 0.4 gm
(Na2 H PO4) Sodium phosphate dibasic anhydrous - 0.65 gm
Water - to 100 ml

Bacteriology

The diagnostic Bacteriology section of the Animal Health Centre is concerned with the isolation of many different bacterial and fungal micro-organisms responsible for diverse diseases in farm animals, poultry, fish, free-ranging wildlife, companion animals and birds.

Culture is made of each separate tissue submitted and pathogenic isolates are identified to species by various biochemical tests.

The serological examination of blood from animals exposed to infectious agents can be helpful in establishing a diagnosis. In addition, tests are made to determine antibiotic or disinfection treatments best suited to control disease processes. Certain autogenous bacterins/vaccines can be prepared, upon request, when a commercial preparation is unavailable.

Microbiological findings are referred to a veterinary pathologist or practising veterinarian for evaluation and treatment recommendations or for advice on animal management.

Important disease trends are reported to Health Management Veterinarians for additional review and for further action, if required. The discovery of disease-producing organisms new to the Province are reported to administrators for possible introduction of protective legislation.

The staff of the Bacteriology Section consists of one veterinary microbiologist, one laboratory scientist- bacteriologist, and one specialist technologist. Bacteriology personnel incorporate new proven procedures whenever practicable and provide accurate findings as quickly as possible.

Routine bacteriology including antibiotic susceptibility testing takes 48 hrs. in about 80% of the cases. Slow growing organisms require 3-4 days for sufficient growth for identification, e.g., anaerobes. Mycology requires from 1-5 weeks depending on suspect agent. Organisms like Listeria which require cold enrichment also may take from 10 days to 5 weeks.

Serology for Leptospira, which is batched prior to sending to a reference lab, may take up to 2-3 weeks for final report.

Toxicology/Clinical Nutrition

Two Laboratory Scientists in the toxicology section of the Animal Health Centre provide analytical chemistry services for the veterinary pathologists/clinicians to confirm the diagnosis of disease due to deficiencies or excesses of chemical agents; to monitor trace mineral and macro-mineral nutriton of livestock; to confirm a diagnosis in cases of suspected malicious or accidental poisoning.

Analyses available include mineral levels in serum and tissues, toxin levels in tissues, feeds, stomach contents; presence and concentrations of feed additives; mycotoxins in feeds and serum levels of vitamins A and E.

New procedures which would provide more rapid results or more accurate analysis are constantly monitored.

Toxicology analyses are completed as quickly and accurately as possible. A laboratory objective is to complete all analyses within five working days of sample reception.

Notes

Toxicology Table

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Acids & Alkalis	Stomach contents or suspect material - 20 ml	Rumen pH 6.5-7.0	<5.0 or >8.0		Detection of pH change. Rumen pH should be checked immediately as levels increase on exposure to air.
Algal poisons ** (blue green algae)	Water with dense bloom of algae - 500 ml	Qualitative detection			Anatoxin A, an alkaloid and microcystin A, a peptide, can be detected. Refrigerate over the weekend. Algal identification.
Alkaloids **	Plant tissue and rumen contents - 1 litre. Under special circumstances blood, urine & liver are necessary	Qualitative detection			Generally the source is poisonous plants. Usually detection proves the diagnosis. Quantification produces values difficult to interpret because the alkaloids are metabolized.
Allylisothiocyanate **	Representative feed sample - 10 g				Found in stinkweed, fanweed, mustard & horseradish which may be incorporated into hay bales or grain ration. Toxin is quantified to indicate dangerous quantities in feed.
Anticoagulant Rodenticides	Blood serum, stomach contents, liver, kidney - 20 g	Qualitative detection			Examined for chlorophacinone, diphacinone, bromadialone, brodifacoum, warfarin, dicoumarol pindone, coumachlor, coumafuryl.
Arsenic	Liver - 20 g Kidney - 20 g Urine - 200 ml Feed - 0.5 kg Feces, blood - 20 ml Stomach content - 20 g	<0.5 ppm <0.5 ppm <0.5 ppm		>2 ppm >5ppm >5 ppm	There are many types of arsenic poisoning, i.e. acute, chronic, inorganic or organic so analysis and significant levels will vary. Some of the organo-arsenical feed additives can be identified.
Barbiturates	Blood - 10 ml Tissue - 20 g	Qualitative Detection			Test is designed to detect barbiturates in animals exposed accidentally, e.g., consumption of meat from euthanized animal.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Cadmium	Liver - 20 g Kidney - 20 g	<0.2 ppm <0.2 ppm		>100 ppm	Toxicities are rare but accumulations in kidneys >0.5 ppm can be of public health significance.
Calcium	Serum - 4 ml Eye fluid - 4 ml (vitreous humor) Kidney - 10 g	Cattle 8-10mg/dl 5-8 mg/dl 100 ppm	<7 mg/dl <4 mg/dl	>1000 ppm	Elevated kidney calcium may indicate ethylene glycol or Vitamin D toxicity or Clostridium perfringens infection.
Carbamates ** Pesticides	Stomach or gizzard contents or feed 25 g	Qualitative detection quantification is not significant			Cholinesterase determinations are not suitable because alkylation inactivating cholineserase is much weaker than with organophosphates.
Cholinesterase Activity	Brain (whole or half) Blood (EDTA) 2 ml	Vary with species			Inhibited by organophosphate poisoning.
Chloride	Serum 4 ml Feed (see salt)	Cattle 97-111 mEq/liter 0.1 - 0.5%		Poultry >1.0%	
Chlorinated ** hydrocarbon Pesticides	Fatty tissue - 50 g Feed - 1 kg Stomach contents - 10 g Liver - 10 g	Negative			Interpretation of the significance of levels can be difficult.
Cicutoxin ** (Water Hemlock)	Plant material from mouth or esophageal groove - 25 g			Detection	Random rumen samples are not suitable submissions.
Blood Urea nitrogen (BUN)	Serum - 4 ml (red top)	Cattle 7-15 mg/dl	<6 mg/dl	>20 mg/dl	Levels >16 may cause infertility Levels >20 do cause infertility Levels increase with excessive degradable protein, urea or nitrate in diet.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Copper	Serum - 4 ml Liver - 10 g Kidney - 10 g	Serum Cattle - 0.6-1.5 ppm Horse - 0.9-2.0 ppm Sheep - 0.8-2.0 ppm Swine - 1.7-3.0 ppm Cattle, sheep & goats: Liver (wet weight) 25-100 ppm Horse, pig: Liver 4-8 ppm	<0.50 ppm <0.50 ppm <25 ppm <3 ppm	 >250 ppm >200 ppm	Serum is not a reliable indicator of copper status. Liver samples are much better. Kidney should be analyzed if toxicity is suspected.
Cyanide	Feed, stomach contents - 100 g Blood (1% NaF preservative) - 10 ml	<0.1 ppm		Detection >0.5 ppm	Freeze the specimens
Cyanogenetic glucosides (chokecherry, arrow grass, etc)	Plant material. Rumen contents selected from esophageal groove. 50 g			Detection	Animals generally graze on wilted or damaged chokecherry bushes. Cyanogenetic glycosides are converted to HCN gas which is poisonous. Dead animals are usually found on pasture and on post mortem the rumen is opened and HCN gas is lost. Special efforts are necessary to preserve the rumen contents to find HCN. Immediate freezing or preservation in $HgCl_2$ is necessary.
Dicoumarin (Mycotoxin from mouldy sweet clover) Anticoagulant	Feed sample - 50 g Body tissues - 10 ml Blood - 20 ml			10 ppm interferes with blood clotting 20-30 ppm toxic and may be fatal.	Dicoumarin is not evenly distributed in a bale of hay. Negative results may still be associated with signs of hemorrhage and abortion. Any detection in blood is significant.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Ergot**	Plant material. Grain 100 g	Count the number of sclerotia in feed by weight		0.1 to 0.3% sclerotia used cautiously. Over 0.3% should be avoided.	Count the # Examination is for ergot fungus of sclerotia itself. If feed is ground the ergot alkaloids can be detected chemically, but safe or unsafe levels of the alkaloid have not been established. Chemistry can be performed at the Animal Health Centre but is for detection not evaluation.
Ethylene Glycol	Stomach contents - 20 g Blood - 10 ml Urine - 10 ml Kidney - 20 g	Negative		>5 mg/dl >2 mg/dl	The lab is not staffed or equipped to perform analyses on emergency basis. Call lab before submitting. Blood must be analyzed within 12 hrs of collection.
Fat in Bone Marrow	Bone marrow - 5 g or Whole bone (femur)	>70%	<5.0%		Used to assess the nutritive status of an animal.
Feed Additives	Representative samples of feed - 50 g Liver and kidney - 20 g				Various feed additives can be detected at concentrations toxic or significant to animal health. Contact the lab when requesting these tests.
Fluroacetate** Sodium (1080)	Stomach contents - 10 ml			Detection	Animals with 1080 poisoning vomit so it is difficult to find stomach contents. 1080 is converted to citric acid in the body before poisoning can occur which makes it difficult to diagnose by analysis.
Fluoride	Urine (20 ml) Blood (10 ml) Rib Bone (20 g) Feed (50 g) Water (100ml)	< 5 ppm < 0.3 ppm < 2000 ppm < 10 ppm <1.5 mg/L		> 15 ppm > 0.5 ppm > 6000 ppm > 30 ppm > 1.5 mg/L	Source-non defluorinated phosphate source used in mineral supplements. Aluminum smelters or fertilizer production plants. Deep well water.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Iodine (Total)	Serum - 4 ml Cattle Milk - 20 ml Feed - 100 g	10-30 µg/dL 30-300 µg/L – Only water soluble Iodine detected –	< 5 µg/dL < 25 µg/L	> 100 µg/dL > 1000 µg/L	
Iron	Serum - 4 ml Swine Liver - 25 g Feed - 100 g **	0.50-3.0 ppm 100-200 ppm	<50 ppm	>400 ppm	Hemoglobin and PCV serve as better parameters of iron sufficiency than serum iron.
Lead	Whole blood (Heparinized) - 20 ml Cattle Liver, kidney - 10 g Rumen or fecal content or feed - 100 g Urine - 10 ml	< 0.2 ppm < 0.5 ppm < 5.0 ppm		> 0.4 ppm > 10 ppm > 100 ppm	Should submit both liver and kidney as one or the other may not contain diagnostic levels depending on acuteness of toxicity. From live animal submit blood, feces & urine.
Magnesium	Serum - 2 ml Cattle Eye fluid - 2 ml (Vitreous Humor)	1.8-3.2 mg/dl 1.9-2.8 mg/dl	< 1.0 mg/dl < 1.5 mg/dl		Symptoms occur at <1.0 mg/dl. Test 10% of herd to establish magnesium status. Eye fluid may be used up to 24 hours after death.
Manganese	Liver - 25 g Cattle Kidney - 25 g Feed - 100 g **	2 - 6 ppm 40 - 100 ppm	< 20 ppm	>2000 ppm	Manganese levels in tissues - ie. blood and liver do not reflect dietary intake. Feed analysis is recommended.
Mercury	Whole blood (Heparinized) - 5 ml Liver, kidney - 25 g Feed - 100 g	< 0.1 ppm < 0.1 ppm < 0.1 ppm		> 5 ppm > 5 ppm	In toxicities mercury accumulates in kidney. High levels can occur in tissues with no toxic signs.
Metaldehyde (as acetaldehyde)	Stomach contents - 10 g	< 50 ppm		> 100 ppm	The toxin may be identified by finding excess aldehydes in the stomach.
Molybdenum **	Feed - 100 g Cu:Mo	> 6:1		Cu:Mo < 2:1	Must also analyse for copper.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Mycotoxins Specific mycotoxin must be specified (screening tests are no longer performed)	Feed sample - 500 g				No mycotoxin cases have been confirmed in B.C. since 1972-73, at which time T2 toxin was isolated from barley overwintered in the field in the Peace River area.
** Aflatoxins	- (liver damage)			>0.1 ppm	
** Ochratoxins	- (kidney damage)			>0.2 ppm	
** Zearalenone	- (estrogenic in pigs)			>1.0 ppm (swine)	
** T-2 toxin	- (feed refusal, scours)			>1.0 ppm	
** Vomitoxin (DON)	- (emetic)			>2.0 ppm (swine)	
Dicoumarol	- (anticoagulant)			Detection	
Ionophores Monensin (Rumensin) (Coban) Salinomycin (Coxistac) Narasin Maduramycin	Feed - 500 g (Quantification performed only by special request)	30 g/ton feed (cattle)		Monensin: Cattle 21.9 mg/kg body wt. Sheep 12 mg/kg body wt. Horse 2-3 mg/kg body wt. Turkey > 12 ppm diet.	Ionophores cannot be detected in stomach contents or tissues.
Nitrates Spot test	Feed or plant material 50 g Vitreous humor (eye fluid) 1 ml Water 100 ml	Nitrate Toxicity in Ruminants	>1.50% NO3 may be lethal >1.00% NO3 is potentially lethal >0.50% NO3 may cause abortions >0.12% NO3 may cause infertility >0.05% NO3 reduces magnesium availability		DO NOT send rumen contents for nitrate analysis. Blood turns brown with acute toxicity. Vitreous humor from a poisoned animal may give a +ve spot test. Quantified if spot test positive.
Organophosphate (OP) Pesticides **	Feed or stomach contents - 10 g Liver - 20 g Brain 1/2 or whole - for cholinesterase activity				It is important to specify which OP the analysis is trying to detect.
Minerals Package	Liver: Se, Cu, Zn, Fe, Mn, Pb, Cd, Ca, Mg Kidney: Cu, Zn, Fe, Mn, Pb, Cd, Ca, Mg Serum: Se, Cu, Zn, Ca, Mg, P, I				The packages shown are run routinely. Blood samples should be submitted in Royal Blue Top (trace mineral) vacutainer tubes. Red Tops will distort zinc levels and may distort copper & selenium. Tiger Tops should **never** be used.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Pentachlorophenol ** (PCP)	Rumen or stomach content - 10 ml Urine - 25 ml			Detection	PCP is rapidly excreted within 5 days through the urine. Toxic effects can be accentuated by contaminants such as dioxins or furans.
Petroleum ** hydrocarbons	Rumen or stomach contents - 20 g Intestinal content - 20 ml Sample of the source or suspect material - 100 ml			Detection	Any level of hydrocarbon confirms exposure and consequently toxicity.
Phosphorus ** (inorganic) phosphorus (Total)	Serum - 4 ml Feed - 100 g**	Cattle 5.0-7.2 mg/dl	1.5-3.5 mg/dl	—	Blood levels of phosphorus are a good indicator of dietary intake and are helpful in assessing the nutritional (total) status of P in the body.
Potassium	Serum - 4 ml Feed - 100 g **	Cattle 4.1-5.8 mEq/litre 1.0-2.5 %		>4.0%	Serum is not a good guide to potassium status. Feed analysis is preferable. Desirable ratio is Ca + Mg: K= 1.0:2.2
Salt (NaCl)	Feed sample - 50 g	Young turkeys >0.3%	<0.03%	>2% NaCl	Toxic value will depend on species of animal and supply of water available.
Selenium	Serum - 4 ml Liver - 10 g Feed - 20 g	Cattle 0.07-0.20 ppm >0.25 ppm >0.30 ppm	<0.040 ppm <0.200 ppm <0.100 ppm	>3.00 ppm >3.00 ppm >5.00 ppm	Interpretation of serum levels varies with species and supplementations.
Sodium	Serum - 4 ml Feed - 100 g **	Cattle 135-150 mEq/litre >0.2% Na	<0.1% Na	>7.0% Na	Serum not a good indicator of dietary intake. Feed analysis is preferable.
Strychnine & (Nicotine and Roquefortine)	Entire stomach contents of small animals. Liver & kidney - 25 g Urine - 10 ml			Detection	Strychnine must be identified in the tissues; i.e., liver or kidney, for a definite legal conviction. Strychnine cannot be demonstrated in the blood but is found in urine within 30 mins. of ingestion.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Sulfamethazine **	Serum, urine 2 ml			Detection	ELISA test for sulfamethazine only.
Sulfonamides screening (specify which sulfa if known)	Liver - 25 g Kidney - 25 g Feed - 50 g			Detection	Quantification not normally performed; sulfa screen generally only performed on feeds.
Thallium	Urine - 100 ml Feed or bait - 20 g	<0.01 ppm negative		>0.10 ppm	Occurrence rare, once used as a rodenticide.
Urea	Feed - 50 g			>1% of total ration >3% in grain	Diagnosis of urea toxicity is difficult since ruminants can adapt to high intakes if introduced gradually.
Urinary calculi	Bladder stones Send available amount				Identification of major ingredients is performed.
Vitamin A	Serum - 4 ml	Cattle >40 µg/dl	<10 µg/dl		The newborn calf (up to 1 month of age) does not store Vitamin A in the liver so assays are always low. To check the Vitamin A status of a newborn calf, forward a sample of serum from the dam.
	Liver - 10 g	Cattle 15-125 µg/g	<2 µg/g		
Vitamin E	Serum - 4 ml	>200 µg/dl	<150 µg/dl		Sample must be fresh and from live animals.
Warfarin (see also anticoagulants)	Whole blood - 10 ml Tissues - 25 g			Detection	Warfarin poisoned animals can be detected but there are 5 other commonly used anticoagulants which cannot be detected by the examination for Warfarin. Dogs are extremely resistant to warfarin and are rarely poisoned.
Water Analysis **	Collect kit (comprised of bottles, submission forms and sampling instructions) from Animal Health Centre or local government agent.				Analyses are performed by a private laboratory at a fee for service. Fee must accompany samples. An interpretive fact sheet accompanies the results.

SUBSTANCE	SPECIMEN REQUIRED	NORMAL LEVELS	DEFICIENT LEVELS	TOXIC LEVELS	SPECIAL COMMENT
Zinc Phosphide	Stomach contents - 25 g "Bait"			Detection	An older rodenticide sometimes found around grain elevators.
Zinc		Cattle			
	Liver - 20 g	>25 ppm	<25 ppm		Tissue levels are not good indicators of dietary intake but are of some use in indicating infectious conditions. Feed analysis is best guide to nutrition.
	Kidney - 20 g	16-25 ppm			
	Serum - "Royal Blue Top"	>0.70 ppm	<0.50 ppm		
	Tube - 5 ml				
	Feed - 50 g **	50 ppm	<40 ppm		

** These tests are not performed at the Animal Health Centre – phone for instructions.

Diagnostic Virology

The diagnostic Virology section of the Animal Health Centre (AHC) began in 1972 with the purchase of an egg incubator for isolation of avian viruses. Since that time, this section has been expanded to include routine virus detection and identification of over eighty pathogens in twelve major species of birds, companion, and food and fur producing animals. In addition, special virus testing is available for wild, exotic and zoological specimens as well as marine mammals and fish. The virology section of the AHC offers one of the most extensive and complete services available in Canada.

The staff of this section consists of the veterinary virologist, two laboratory scientists, and two full time technicians. All of the personnel of the Virology section are highly specialized technologists with a minimum of ten years experience in diagnostic veterinary virology.

The Virology section endeavours to provide the very best diagnostic services available and to introduce new test procedures for emerging virus pathogens as they become available.

Submission of Specimens for Virus Diagnosis

1) All isolation procedures for virus agents are delicate, difficult and time consuming. Only tissues from freshly dead animals are satisfactory for virologic examination. Autolyzed tissues are useless.

2) **Tissue Specimens** for virus isolation should be collected promptly, placed in an appropriate container (plastic bags are excellent) and refrigerated or frozen as soon as possible. The use of ice pack refrigerants to keep the specimens cold while in transit is extremely important for for virus diagnosis. If specimens are frozen, they must remain frozen in transit and not be allowed to thaw out. **If you are not sure that specimens will remain frozen, please send sample refrigerated only.**

3) Individual viral culturettes (used for nasal, tracheal, anal and cloacal swabs) are a sterile, disposable collection and transport system for viral specimens only. They cannot be used for bacterial culture, likewise bacterial culturettes cannot be used for virus isolation. Virus culturettes containing media/antibiotics are preferred because they allow direct electron microscopy (EM) as well as isolation (cultivation) procedures. Culturettes containing gelatin or agar are unsuitable for direct EM.

   Virus culturettes can be obtained from Baxter Canlab, 8590 - Baxter Place, Burnaby, B.C. V5A 4T2; Phone: 1-800-661-5617. Current price (1991) $90.00 per pkg. of 100 culturettes. Virus culturettes can also be obtained from the Animal Health Centre for $1.00 each.

4) Viruses can be denatured by light, heat, dehydration and pH changes among other things. **Therefore, specimens and swabs must be sealed.**

5) All avian serology except chick anemia agent (CAA virus) will be performed by the Animal Health Monitoring Laboratory (AHML). Information and charges concerning avian serology can be found the AHML section.

6) Virus isolation and identification procedures can take from one day to several weeks, depending on virus type and procedures required. Call the Animal Health Centre for information on length of time for identification or for any other information.

Virology - Preferred Specimens

The following tables show the diagnostic tests offered by the Virology Section. Each table details the appropriate specimen and procedures used for virus detection or serological analysis. Enquiries for virus tests other than those listed should be directed to the Virology laboratory staff.

Abbreviations used:

AGID	Agar Gel Immunodiffusion
CIE	Counter Current Immuno-electrophoresis
CS	Cloacal Swab
Eggs	Embryonated Eggs
ELISA	Enzyme Linked Immunosorbent Assay
EM	Electron Microscopy
FS	Fecal Swab
FA	Fluorescent Antibody
HA	Hemagluttination
HI	Hemagluttination Inhibition
IFA	Indirect Fluorescent Antibody
IEM	Immune Electron Microscopy
IP	Immunoperoxidase
JS	Joint Swab
NS	Nasal Swab
PA	Plate Agglutination
RID	Radial Immunodiffusion
TC	Tissue Culture
TS	Tracheal Swab
VN	Virus Neutralization
VS	Vaginal Swab

N/A = Not available
* = Limited availability

Specimen Selections for Virus, Chlamydia & Mycoplasma Isolation & Serology

Avian Diseases: Table #1

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume
Infectious (ILT) Laryngotracheitis	trachea, TS, lung	FA/TC/ EM/Egg	VN	1.0 ml
Newcastle Disease (ND)	trachea, TS, lung brain, proven-triculus, cecal tonsil	FA/TC EM/Egg	ELISA, HI	See AHML Section
Infectious Bronchitis (IB)	trachea, TS, lung, FS, cecal tonsil, kidney	FA/TC EM/Egg	ELISA	" "
Avian Encephalo-myelitis (AE) or Epidemic Tremors	brain, pancreas	chicks*	ELISA AGID	" "
Avian Influenza (AI)	TS, CS, trachea lung, liver, brain	EM/TC/Eggs	AGID/HI	" "
Paramyxovirus (Yucaipa, PMV-3 etc.)	TS, CS, trachea, lung	EM/TC/Eggs	HI	" "
Inclusion Body Hepatitis (Adenovirus)	liver, spleen	EM/TC/Eggs	AGID	" "
Respiratory Adenovirus	TS, trachea, lung	EM/TC/Eggs	AGID	" "
Quail Bronchitis (Adenovirus)	TS, trachea, lung	EM/TC/Eggs	AGID	" "
Turkey Hemorrhagic Enteritis (Adenovirus)	spleen, liver,	EM/AGID	AGID	" "
Infectious Bursal Disease	bursa of Fabricius	EM/TC/Eggs	ELISA	" "
Fowl Pox (or Avian Pox)	pox lesions on head and skin, trachea	EM/TC/Eggs	N/A	
Viral Arthritis/ Renosynovitis (Reovirus)	JS, tendons, heart (chicks)	EM/TC/Eggs	ELISA	See AHML Section
Reoviruses (Enteric and Respiratory)	gut & fecal contents, trachea, lung	EM/TC/Eggs	ELISA	" "
Poultry Enteric Viruses (Astro, Rota Calici, Parvo, etc.)	gut and fecal contents	EM	N/A	
Marek's Disease	N/A	N/A	N/A	
Pacheco's Disease (Parrot Herpes)	trachea, lung,	EM/TC	N/A	
Duck Viral Hepatitis	liver, spleen, kidney	EM/TC/Eggs	N/A	
Duck Viral Enteritis	liver, spleen, intestine	EM/TC/Eggs	N/A	
Chick Anemia Virus (CA)	liver, feces	TC/FA	IFA	1.0 ml
Mycoplasma gallisepticum, synoviae	See bact. section		ELISA/HI	See AHML Section
Chlamydiosis	respiratory tract, liver, spleen, feces	TC/FA	N/A	

Specimen Selections for Virus, Chlamydia & Mycoplasma Isolation & Serology

Bovine Diseases: Table #2

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Infectious Bovine Rhinotracheitis	NS, VS, trachea, esophagus, rumen Fetus: lung, liver, kidney	EM/FA/TC	VN	1.0 ml
Bovine Virus Diarrhea	NS, buffy coat cells (10 ml blood - EDTA - refrigerate), fecal, FS, intestine, Peyer's patches, spleen	FA/TC	VN	1.0 ml
Bovine Para-influenza Type #3	NS, lung	FA/TC	VN	1.0 ml
Bovine Respiratory Syncytial Virus (BRSV)	deep NS, lung	FA/TC	VN	1.0 ml
Bovine Adeno-viruses (Subgroup #1/#2)	NS, feces, FS, respiratory tract	TC	VN	1.0 ml (type 3 only
Papular Stomatitis	Upper digestive tract lesions	EM/TC	N/A	
Pseudocowpox	teat lesions	EM/TC/Eggs	N/A	
Neonatal Calf Diarrhea (Rota-virus, Corona-virus)	5.0 ml feces, ileum, spiral colon, FS	EM	N/A	
Bovine Respiratory Corona Virus	NS, lung, trachea	EM/TC	N/A	
Bovine Parvovirus	5.0 ml feces, intestine, FS	EM/TC	HI	1.0 ml
Bovine Leukosis		N/A	AGID	See AHML Section
Bovine Chlamydia	Fetus: lung, placenta FS	TC/FA	N/A	

Specimen Selections for Virus, Chlamydia & Mycoplasma Isolation & Serology

Equine Diseases: Table #3

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Equine Viral Rhinopneumonitis	NS, Respiratory tract Fetus: lung, liver, spleen	EM/TC	VN	1.0 ml
Equine Influenza	NS, Respiratory tract	EM/TC	HI	1.0 ml
Equine Adenovirus Pneumonia	NS, lung	EM/TC	N/A	—
Equine Encephalomyelitis (WEE)	Lung	TC	HI	1.0 ml
Equine Viral Arteritis	NS, conjunctival swab, buffy coat cells (10.0 ml blood - EDTA - refrigerate), mesentery lymph node, liver lung, kidney, spleen Fetus: placenta, liver, kidney, spleen	TC	VN	1.0 ml
Equine Rotavirus	Feces, FS	EM	N/A	

Ovine and Caprine Diseases: Table #4

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Contagious Ecthyma (ORF)	lesions (crusts)	EM/TC	N/A	
Enzootic Abortion (Chlamydia)	fetus/placenta	TC-FA	N/A	
Rotavirus	FS/feces 5.0 ml jejunum, colon	EM	N/A	
Caprine Arthritis Encephalitis virus (CAEV)	N/A	—	AGID	See AHML Section

Specimen Selections for Virus, Chlamydia & Mycoplasma Isolation & Serology

Porcine Diseases: Table #5

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Transmissable Gastroenteritis (TGE)	FS, feces - 5.0 ml, jejunum	IEM/TC/IP	VN	1.0 ml
Swine Influenza	NS, trachea, lung	EM/TC/Egg	HI	1.0 ml
Porcine Parvovirus	Fetus: whole fetus, lung, liver, kidney, spleen, placenta, heart blood	EM/TC	HI	0.5-1.0 ml
Hemagglutinating Encephalomyelitis	brain, upper spinal cord	TC	VN/HI	1.0 ml
Porcine Diarrhea Conditions (Rota, Astro, Calici, Non-TGE, Corona, etc.)	FS, 5.0 ml feces, small intestine	EM	N/A	—
Encephalo-myocarditis	Fetus: fetal sera/ thoracic fluids, heart, liver, lung	TC	TC	0.5 ml serum/ thoracic fluids
Swine Pox	skin lesions	EM	N/A	—
SMEDI viruses (Enterovirus)	Fetus: whole fetus, lung, intestine Pig: FS	EM	N/A	—
Porcine Cytomegalovirus	buffy coat - 10 ml EDTA blood, lung, urine	TC	N/A	—

Canine Diseases: Table #6

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Canine Parvovirus	FS, 5.0 ml feces, intestine	EM/HA	HI	1.0 ml
Canine Distemper	Buffy coat - 10 ml EDTA blood, lung, kidney, liver	EMTC/FA	VN*	1.0 ml
Infectious Canine Hepatitis	liver, feces 5.0 ml, NS	EM/TC/FA	VN*	1.0 ml
Canine Herpes (Neonatal Herpes)	lung, liver	EM/TC	N/A	
Canine Para-influenza (Kennel Cough)	NS/TS, trachea	EM/TC	N/A	
Canine Respiratory Adenovirus	NS, ocular or pharyngeal swab	TC	N/A	
Canine Coronavirus	FS, feces 5.0 ml	EM/TC	N/A	

Specimen Selections for Virus, Chlamydia & Mycoplasma Isolation & Serology

Feline Diseases: Table #7

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Feline Panleukopenia Virus	kidney, liver, small intestine	EM/TC	N/A	
Feline Viral Rhinotracheitis	pharyngeal swab, NS, lung, conjunctival swab	EM/TC	N/A	
Feline Calicivirus	NS, pharyngeal swab, lung	EM/TC	N/A	
Feline Infectious Peritonitis	peritoneal fluid, spleen, kidney, lung,	TC	N/A	

Miscellaneous Diseases: Table #8

DISEASES	VIRUS DETECTION		SEROLOGY	
	Specimen	Method	Test	Volume of Serum
Mink Enteritis (Panleukopenia)	gut, liver, lung, kidney	EM/TC	N/A	
Mink Distemper (Canine Distemper)	lung, liver, kidney, spleen	EM/FA/TC	N/A	
Aleutian Disease	—	N/A	CIE - Capillary tubes-heparinized	
Mink Rota/Corona	intestine, FS, feces, 5.0 ml	EM	Contact Virology Section	
Pigeon/Pheasant/ Raptor Herpes	TS, trachea, lung, liver	EM/TC/Eggs	N/A	
Rabbit Papova	gut, papule lesions	EM	N/A	

Specific Instructions for Various Examinations

1) Abortion Diagnosis
2) Preparation of Fish Tissues for Histopathology
3) Avian Necropsy Procedure
4) Disease Investigation for Poultry

Notes

Specimen Submission for Abortion Diagnosis

Abortion Submissions and Specimens

The history of the dam should indicate whether primiparous or multi-parous, nutritional status, previous illnesses or stresses, vaccination history, general level of management and herd health status, recent additions to herd, previous abortions or indications of infertility.

Very often specific abortifacients may only produce lesions or characteristic changes in one or a few tissues. To maximize the possibility of detection of these agents, ***submit all fetal tissues, including placenta, heart blood and stomach contents on a routine basis.***

With swine, sheep, and goats it is usually convenient to submit entire fetuses. The specimens should be chilled (not frozen) and packed with sufficient ice to keep them chilled until they arrive at the laboratory. Bacterial decomposition generally is not the problem with aborted fetuses that it is with carcasses of animals born alive. (1) With modest care, abortion specimens will arrive at the laboratory in condition suitable for examination.

Because of their size, it is often more convenient for the practitioner to necropsy aborted foals and calves and submit selected tissues to the diagnostic laboratory.

Minimum Requirements for a Complete Examination

The following specimens constitute the minimum requirements for a complete examination:

Frozen or refrigerated:

1) **Placenta:** (if available). Very important. Entire placenta from horses, sheep and swine if possible: two or more cotyledons, especially with any lesions, from cattle.
2) **Stomach contents:** A few ml collected in a syringe. Send chilled.

   Fetal heart blood: A few ml chilled.
3) **Dam's serum**: Draw 5 to 10 ml of blood and allow it to clot overnight at room temperature. Remove the clot the following day and submit serum with other specimens. Preferably follow with a convalescent sample in two weeks.
4) **Fetal tissues**: Formalin-fixed in 10% neutral buffered solution:

   eyelid (both skin and conjunctival surfaces)
   thyroid
   lung
   spleen
   adrenal
   heart (portion of both ventricles)
   ileum with portion of Peyer's patches
   thymus
   liver
   kidney
   brain (portions of cerebellum, brain stem, and cerebrum)

Fresh chilled fetal tissues: lung, liver, kidney, spleen. Fetal heart blood.

Supplementary tissues or submissions:

Urine: Useful in leptospiral FA tests. Send chilled, with one drop of formalin per 20-30 ml urine.

Milk: May be useful in leptospiral tests. Fresh and preserved as with urine.

Amnion: Useful in **Ureaplasma diversum** diagnosis. Send formalin fixed and fresh chilled, along with other routine samples. For storage, -70°C is preferred to -20°C. Send chilled samples promptly.

Brain: Entire brain, formalin-fixed. Useful in toxoplasma abortion in sheep, goats. Useful in BVD abortion in cattle.

For Vibrionic abortion (Campylobacter fetus ss fetus): tampons and containers bags must be provided by this laboratory. Avoid fecal contamination. Refrigerate or freeze.

** *If there are any questions phone and speak to a pathologist.*

Reference:

1) Kirkbride, CA. Laboratory Diagnosis of Livestock Abortion, 3rd edition, 1990. Iowa State University Press, Ames, Iowa.

Preparation of Fish Tissues for Histopathology

Specimen Collection

Fixation is the process of killing and hardening tissue. Tissues from poikilotherms tend to decompose rapidly after death, and therefore should be placed in fixative immediately upon removal from the carcass. If fixative is not at hand then try to keep the tissue iced or refrigerated. **Do not freeze**, as this will destroy most of the cellular detail.

Small fish, up to 5 or 10 cm in length, may be fixed whole. Slit open the muscle along the ventral surface and remove the covering muscle on one side of the abdomen in the larger fish, to allow fixative to reach internal organs quickly. Keep fish flat - do not bend or twist while fixing.

If fish is larger than 10 cm, or in the case of large lesions, tissue sections should be cut thin enough so that the fixing fluid can penetrate within a reasonably short time. Tissues should be no more than 0.5 cm in thickness, and should be immersed in at least 20 times their volume in fixative. Smaller ratios may be required under field conditions, with some sacrifice in quality of the final product. If the fish is considered to be diseased, fix a portion of all tissues. Include some adjacent normal tissue with the lesion when fixing.

If possible photograph the condition and/or the lesion before processing the tissue.

The accompanying diagram (Diagram 1 on page 41) lists the tissues which should be submitted routinely for histopathologic examination.

1) fin (s)
2) skin with underlying muscle
3) kidney (includes head kidney and posterior kidney)
4) spleen
5) intestine
6) pyloric caeca (includes pancreas)
7) stomach
8) liver
9) heart (atrium and ventricle)
10) eye
11) gill*

**Always submit one or two gill arches - submit brain when feasible.*

Include with the specimen your name and address, your specimen identification number and species of fish. Supply any pertinent information that is available, e.g.:

a) location, date, and method of catch
b) gross description of the lesion - where found, etc.
c) size (length/weight), sex, and age of fish
d) evidence of abnormal behavior
e) whether wild or cultivated fish
f) the number of fish with similar lesions

NOTE

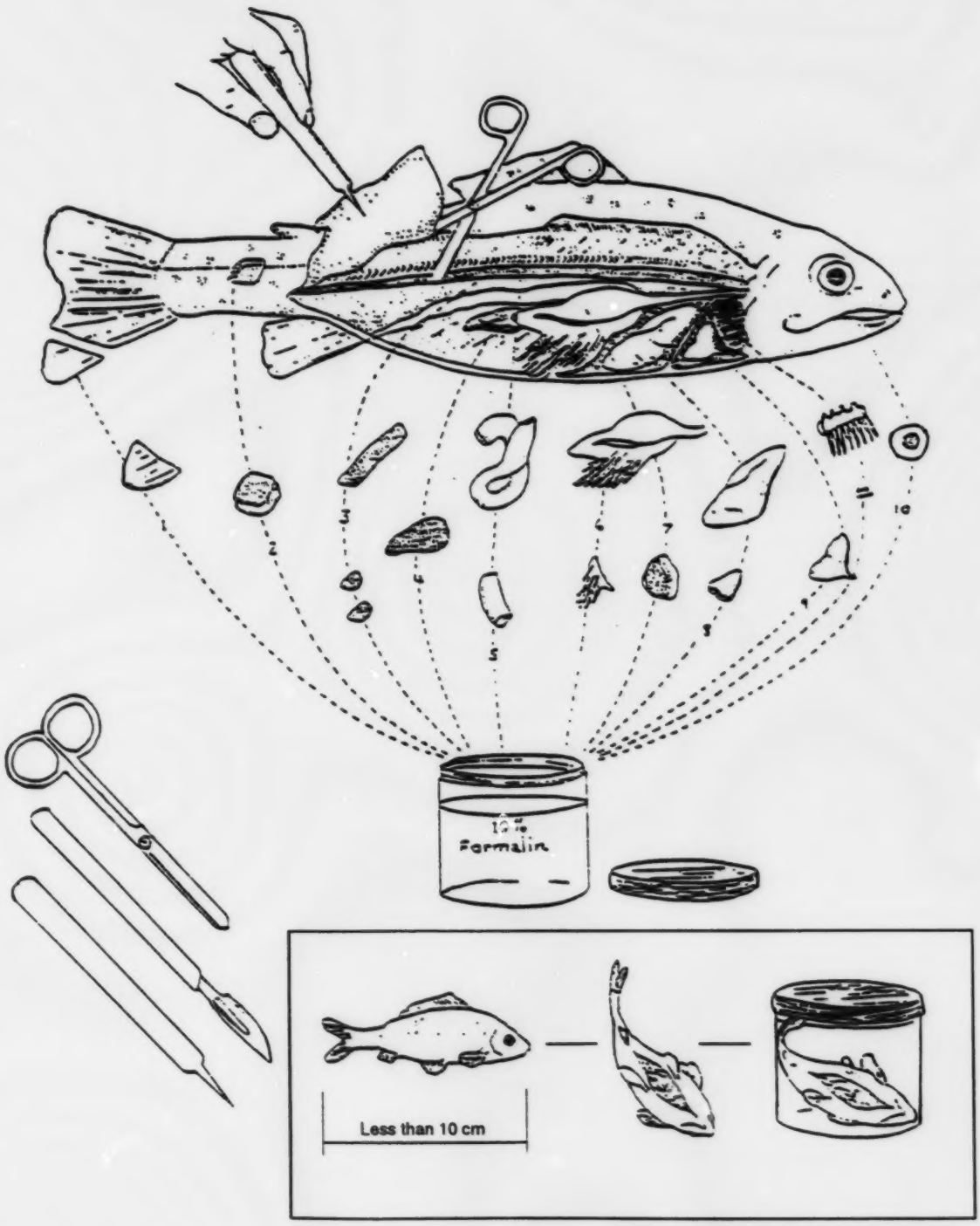
Bacteriological or virological identification cannot be undertaken on formalin-fixed tissue. However, it is possible to observe cellular changes which indicate infection by microorganisms.

The preceding description of fish tissue collection for histopathology has been taken from material prepared for distribution by the Fish Pathology Laboratory, Ontario Veterinary College, and has been used in this submission guide with the permission of the director of the laboratory, Professor Hugh Ferguson.

Preferred fixatives are Bouin's or Davidson's solution for calcified material (skin, gills and whole small fish) and eyes. Ten percent buffered formaldehyde is an acceptable fixative for soft tissues. Please do not ship fixative in the mail - fixed tissues should be wrapped in 70% ethanol soaked paper towels and then placed securely into leak proof plastic bags. There should be no free fluid in the bags. Enclose a copy of the history with tissue submissions, preferably written in pencil.

Please contact the laboratory for direction for submission of samples for any other analysis.

Diagram 1
Formalin Preservation of Tissues for Histopathology



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See Legend on Page 39

Notes

Disease Investigation for Poultry

Modern agricultural economic practices dictate that a large number of birds be raised in close proximity, in confinement housing and within an artificially controlled environment. This, along with genetic selection for break-neck productivity imposes a predominant physiological stress which can manifest itself in a variety of ways, most importantly by increased susceptibility to infections and production related disease. The expression of ill health can be tempered or exacerbated by management level and dedication of the farm manager. In the course of disease investigation, the poultry practitioner must cover a lot of ground since the **majority of production problems are directly related to intensive management systems** rather than infectious disease.

The first step is to clearly define the problem. As always, a complete and relevant history is critical. It should include flock health program information such as the vaccination schedule (timing, type, mode and any noted reactions), baseline ELISA serology profiles and previous treatment protocols. Current performance should be compared with known standards of production or the production records of previous flocks. On farm record-keeping is vital since it allows early detection of problems and also makes obvious to the producers the benefits of your recommendations for treatment or management changes.

Flock problems present themselves as increased morbidity, mortality or production drops. "Acceptable" levels of mortality for each type of production bird exists within the industry. For example, 4% mortality is acceptable at the end of 6 weeks in broiler chickens and one half of 1% per month during the lay cycle is acceptable in laying birds. We tend to get more excited about death losses but we must consider that most financial losses are due to reduced productivity and subclinical disease rather than mortality.

Problem definition should also include the number of birds affected, the clinical signs, if any, and the onset and duration of the problem. Can these be correlated to recent changes in personnel, feed load or weather? On-farm investigation involves systematic evaluation of management and can be facilitated by using the FLAWS guideline. FLAWS stands for:

Feed (consumption, efficiency, quality)

Litter (type, quality, moisture)

Air (ventilation, temperature, dust, NH_3)

Water (spacing, quality, sanitation)

Space (density: 0.75m^2 per broiler, 3 vs. 4 layers/cage)

Now look at the birds. Can coughing or snicking be heard or is there any change in activity? Are birds distributed evenly throughout the barn? Is there size uniformity? If the problem is

morbidity or mortality, examine sick or dead birds. If the problem is poor growth, focus on the smaller birds. If there has been a drop in egg production, examine birds with visible signs of going out of lay (pale, withered combs, less than 3 fingers between pin-bones, feather molting, etc.). The advantage of working with flocks in the tens of thousands is that a small sample of "representative" birds can be sacrificed to assist in determination of a diagnosis. The Animal Health Centre can assist you with laboratory back-up.

Commercial poultry works on a low margin cost of production and a tightly defined production schedule. If a disease problem persists or has high mortality losses then both the cost breakdown and production cycle are thrown out of line for the rest of the life of that flock. This loss is never recoverable and for this reason poultry producers, more than any other type of livestock producer, require and demand immediate diagnosis and action.

While some diagnostic procedures take time, poultry practitioners must provide tentative diagnoses based on history, on-farm inspections and gross postmortem findings and make immediate action recommendations which can later be modified as new information becomes available.

Avian Necropsy Procedure

General Considerations

In the course of disease investigation postmortems on **representative** birds can be extremely useful. The natural tendency is to sacrifice cull birds but the information gained can be misleading when extrapolating back to the general flock. The necropsy should be performed as soon as possible following death because internal organs decompose rapidly and resident bacteria proliferate. Allow yourself adequate light and space. Use sharp and clean dissecting instruments. It is important to obtain detailed clinical history of the flock. Necropsy procedures should be systematic and complete. Continually consider the specimens to be taken and avoid excessive mutilation of tissues.

Blood Sampling Sites

1) brachial vein (wing) - needle and syringe - scalpel jab (prone to collapse and hematoma)
2) jugular vein - right or left
3) cardiac puncture - not without risks!
4) medial metatarsal vein - prominent in waterfowl
5) decapitation - small birds
   - sample contaminated with tissue fluids

Euthanasia

Humane death achieved **quickly** and **competently** to avoid unnecessary stress.

1) cervical dislocation - manual *
   - scissors
   - burdizzo
   * *note - not a good method for brain or tracheal histology.*
2) suffocation - CO_2, ether, chloroform
3) barbiturate overdose - IV or IC
4) 0.3 - 0.5 ml of 70% alcohol into foramen magnum for songbirds

External Examination

Obtain body weight. Wet the carcass with dilute detergent to reduce the dust and dander. Carefully examine the carcass starting with the head region. Look closely at the beak, eyes, comb, wattles, ears, external nares, mouth, feathering, feet, legs and vent area. Note general body condition. Check closely for external parasites.

Opening the Carcass

1) Place the bird on its back with the head facing away.
2) Incise the skin between the thigh and the abdomen on both sides. Bend the legs down and disarticulate the hip joints.
3) Cut the skin just below the keel and extend forward toward the ribs. Fold the skin forward over the breast and uncover the abdomen. Note pectoral musculature and abdomen.

4) Cut into the abdominal cavity just below the sternum. Using bone scissors extend the cut through the ribs on either side. Cut through the corocoid bones. Remove breast.

5) Peel down abdominal muscle. Examine the exposed liver, heart, thyroids, parathyroids, crop, gizzard, intestines and airsacs *in situ*.

6) Grasp the gizzard on the birds left side and flip it over, exposing the spleen, pancreas and air sacs.

7) Remove the heart. Cut transversely to examine chamber ratio.

8) Cut the esophagus at the proventriculus and remove the abdominal viscera leaving the colon attached at the cloaca.

9) Examine the lungs, kidneys, ureters, adrenals, gonads and bursa.

10) Straighten out the intestinal tract by gently teasing the mesentery. Open out the proventriculus, gizzard, intestines and ceca. Note contents and mucosal lining. Take scrapings as necessary.

11) Reverse the position of the bird.

12) Open the mouth and cut through the angle of the right jaw extending down the esophagus to the crop. Examine crop odor and contents.

13) Note thymus.

14) Open trachea from the glottis down to the bifurcation and into the primary bronchi of the lungs.

15) Remove the upper beak close to the nares and examine the nasal cavity. Cut open the infraorbital sinuses.

16) Remove the brain by cutting off the skull with strong scissors.

17) Examine the sciatic nerves by separating the adductor muscles. They should also be viewed underneath the kidneys by blunt dissection.

18) Cut into the femur and examine the cavity for marrow and medullary bone.

19) Break a metatarsal bone to assess bone strength. Slice through the proximal medial tibia to expose the growth plate. Cut into the hock joint and extend up the gastrocnemius tendon.

Useful Lab Tests

1) **Parasitology**
   - intestinal/skin scraping
   - fecal flotation
   - ID mites/lice direct exam

2) **Microbiology**
   routine culture of liver, spleen, lung, and heart blood. Bone marrow and brain may also be useful.
   - aerobic/anaerobic
   - fungal
   - mycoplasma

3) **Virology**
   - TC, egg inoculation
   - EM
   - serology

4) **Histology**
   microscopic morphologic changes

5) **Hematology, Chemistry**
   underutilized

6) **Toxicology**
   toxicities, nutritional deficiency

Notes

Reportable Diseases
Provincial

Brucellosis
Caseous lymphadenitis
Distemper of fur bearers
Footrot of sheep
Hemophilus pleuropneumonia **(H. Pleuropneumonia)**
Hog Cholera
Infectious laryngotracheitis (ILT)
Leptospirosis of bovine, goat, sheep, swine
Mycoplasma mastitis of bovines
Bovine Tuberculosis

Brucellosis, bovine tuberculosis and hog cholera are also reportable diseases under the Federal Animal Diseases and Protection Act - these diseases should be reported to Agriculture Canada veterinarians.

Leptospirosis is widespread in British Columbia; it can be difficult to diagnose all infected animals, some serovars appear to cause only minor or insignificant health problems. Eradication is not possible.

Hemophilus (Actinobacillus) pleuropneumonia in swine appears to be a stress related disease. At this stage diagnosis of carriers is impossible so that eradication is not contemplated.

Infectious Laryngotracheitis can be controlled satisfactorily by vaccination. Reporting does give us an idea of the incidence so that vaccination can be encouraged if the incidence rises in unvaccinated flocks. Under certain circumstances a flock may be quarantined.

Mycoplasma mastitis in bovines is contagious, causes sudden milk loss, a slack udder and a dilute milky, coffee colored secretion from the udder. At this time there is no cure and animals do not recover. Slaughter of infected animals is essential to protect the herd.

Reportable Diseases
Federal

African Swine Fever
Anaplasmosis
Anthrax
Avian Influenza (Fowl Plague)
Bluetongue
Bovine Cysticercosis
Brucellosis
Contagious Equine Metritis
Dourine
Equine Infectious Anemia
Equine Piroplasmosis
Foot and Mouth Disease
Fowl Typhoid
Glanders
Hog Cholera
Mange - Sarcoptic in cattle, sheep, goats, horses; psoroptic in cattle, sheep and horses
Newcastle Disease
Pullorum Disease
Pseudorabies (Aujesky's Disease)
Rabies
Rinderpest
Scrapie
Sheep Scab
Trichinosis
Bovine Tuberculosis
Vesicular Disease of swine
Vesicular Stomatitis
Vesicular Exanthema of swine

Disease Table*

Special thanks to
Alberta Animal Health Division
for their permission to utilize much of their material in this Table.

Notes

Disease Table*

*(*includes most common disease conditions, some zoonoses and diseases for which inappropriate tissues are often received)*

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Abomasitis **Cl. perfringens** **P. multocida**	Fresh & formalized portions of abomasum	Histopathology & anaerobic culture.	Condition can be confused with Braxy.
Abortions - See Special Examinations			
Acidosis, D-Lactic Sudden ingestion of carbohydrate-rich feed (grain).	1) Whole Animal or 2) Fresh sample of rumen content and, 3) Formalized portions of affected rumen.	1) Whole animal P.M. exam. 2) pH determination of rumen content. 3) Histopathology on affected rumen.	
Arthritides Bovine **H. somnus** **Mycoplasma** sp. **B. abortus** Non-specific joint ill - **A. pyogenes** **F. necrophorum,** **Staph.** sp, **E. rhusiopathiae** **S. dublin &** **S. typhimurium** **B.V.D. (rarely)** **Strep. bovis**	1) Whole animal or, 2) Unopened affected joints or, 3) Formalized portions of synovial membrane and, 4) Swabs from affected joints.	Culture & susceptibility. Histopathology.	The appropriate swab transport media for the agent suspected should be used. (see pg. 25,27). Erysipelas and brucellosis are zoonotic diseases.
Arthritides Porcine **E. rhusiopathiae** **H. suis,** **H. parasuis,** **Mycoplasma hyorhinis,** **B. suis,** **Str. suis,** **Str. equisimilis,** **S. hyicus,** **Actinobacillus** sp. **Mycoplasma hyosynoviae**	Same as bovine.	Same as bovine.	Same as bovine. **Str. suis Type II** is a zoonotic agent (produces meningitis and fatal septicemia)
Arthritides Equine **Str. equi.** **A. equuli** **R. equi.** **S. abortivoequina** **Chlamydia** sp. **Str. zooepidemicus** **Str. equisimilis**	Same as bovine.	Same as bovine.	Appropriate swab transport media should be used (see page 35).

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Arthritides Ovine/Caprine **Mycoplasma** sp. **E. rhusiopathiae** **F. necrophorum** **Staph.** sp. **C. psuedo-tuberculosis** **H. agni** **P. haemolytica** **Chlamydia** sp. **Retro virus**	Same as bovine.	Same as bovine.	Same as bovine.
Bovine Virus Diarrhea **Virus** genus Pestivirus - family Togaviridae	1) Whole animal or, 2) from **Live animal:** Oral lesion, scrapings and/or 10 ml chilled EDTA blood or serum. 3) **Dead animal:** Fresh lesions, spleen, Peyer's Patches, mesenteric lymph nodes, and formalized portions of lesions.	Viral isolation, Fluorescent antibody, E.M., Histopathology, serum neutralization, ELISA test.	Viral isolations require 3 wks. to complete. EDTA or serum sample must be taken in the febrile viraemic stage of the disease. A single serum sample is of no value in the herd diagnosis of B.V.D.
Caseous Lymphadenitis **C. pseudo-tuberculosis**	Affected lymph nodes or swabs from affected lymph nodes.	Culture.	
Clostridial Diseases			
Bacillary Hemoglobinuria **Cl. hemolyticum**	1) Whole animal or, 2) Fresh & formalized 2) F.A.T. - on portions of affected parts of liver	1) Whole animal p.m. exam. and cannot be liver lesion. 3) Anaerobic culture (see page 20).	Organism is very difficult to grow identified adequately.
Blackleg **Cl. chauvoei** **Cl. septicum** (present in mixed infections)	Fresh and formalized portions of affected muscle and heart.	1) F.A. Technique 2) Pathology-gross and microscopic.	A rapid diagnosis can be made using a direct smear examination.
Braxy (Bradsot) **Cl. septicum**	Fresh and formalized portions of affected abomasum.	1) Histopathology 2) Anaerobic culture 3) F.A.T. (Cl. septicum)	Disease is encountered occasionally in young calves.

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Clost. Enterotoxemia **Clost. perfringens** Types C & D	1) Affected formalized intestine 2) 5-10 cm lengths of ileum & colon (chilled). 3) 5-10 cm lengths of ileum & colon (chilled).	1) Histopathology 2) Gram stained intestinal impression smear and culture.	Culturing of visceral organs is of no value in the diagnosis of this disease. Fluid intestinal content must be received at the lab within 6 hrs. of the animal's death.
Malignant Edema **Cl. chauvoei** **Cl. septicum** **Cl. perfringens** **Cl. sordellii** **Cl. novyi**	Whole animal or tissue from area of infected wounds.	1) Anaerobic culture 2) F.A.T. **(Cl. chauvoei, Cl. septicum** 3) Gram Stain	Organisms are common and early postmortem invaders in dead cattle.
Coccidiosis Bovine **E. zuernii** **E. bovis**	Fecal - 50 mls 15 cm portion of affected area - (formalized) 15 cm affected port (fresh).	Histopathology Mucosal smears (prepatent stage)	If the nervous form is encountered, forward fresh and formalized portions of brain to rule out other diseases. (eg, polio & ITEME) along with fresh and formalized portions of intestine.
Coccidiosis Ovine/Caprine Numerous species	Fecal - 50 ml Abomasum - fresh Ileum - 15 cm-fresh Ileum - 15 cm - formalized	Mucosal smear Mucosal smear and/or Histopathology	
Coccidiosis Porcine **Isospora suis** **Eimeria** spp.	Fecal-as much as possible. Entire small intestine (fresh jejunum & leum-formalized)	Mucosal smears and/ or histopathology	Diagnosis in the prepatent period can be difficult. Disease is mainly a problem in 5-10 day old nimals. Submit live or portions from euthanized animals.
Coccidiosis Lapine **E. stiedae** (hepatic) **Eimeria** spp. (numerous species in intestine)	Formalized liver Fecal - 50 ml Entire intestinal tract.	Histopathology mucosal smears	Mere presence of oocysts does not imply active disease. Interpretation of significance of egg counts is difficult.
Deficiencies (See Toxicology Submissions)			

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Dermatosis Infectious and Non Infectious Many etiologies	1) Skin scraping and/or 2) Skin swab and/or 3) Skin biopsy (multiple and identify location)	1) Bacterial culture & susceptibility 2) Fungal culture 3) Direct examination 4) Digest 5) Histopathology	1) Some dermatopnytes cause zoonotic disease. 2) Skin scrapings to be of any value must be deep and taken at the disease interface. Scabs and are of no value. 3) In cases of long standing chronic dermatitis, skin biopsies are of little value in confirmation of etiology.
Distemper Canine Paramyxovirus	1) Whole animal or 2) Formalized-brain, trachea, lung, stomach intestine, urinary bladder, kidney 3) Fresh tissues.	Histopathology Tissue culture.	
Encaphalitides Bovine Many viral & bacterial etiologies.	1) 1/2 brain formalized 2) 1/2 brain chilled	Culture & sensitivity Histopathology Virus Isolation Rabies - forwarded to ADRI (W) Lethbridge.	Brain should be split sagitally - 1/2 forwarded in formalin & 1/2 sent fresh (chilled). Rabies is a zoonotic and a Federal reportable disease.
Encephalitides Equine Many viral, protozoal and bacterial etiologies.	See bovine requirements.	See bovine encephalitides	See bovine sect. Western equine encephalo-myelitis is a zoonotic dis.
Encephalitides Porcine Bacterial infections, viral infections	See bovine requirements.	See bovine encephalitides.	See bovine section.
Enteritides, Neonatal Bovine Bacteria, viruses, cryptosporidia	1) Whole animal or 2) Fresh and fixed ileum, jejunum and colon (inflate lumen of fixed samples with formalin) 3) Formalized portions of other organs as deemed necessary.	1) Whole animal P.M. exam. 2) Culture & sensitivity. 3) Indirect Fluorescent Antibody Test (**E. coli**, K99+) 4) Histopathology 5. D. smear exam for cryptosporidia.	1) Sens. tests are performed only on entero-toxigenic **E. coli** from untreated calves. 2) Mgmt. changes are of prime importance compared to the L.D. of etiologic agents when addressing a scours problem. 3) Crypto-sporidiosis is a zoonotic disease.

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Enteritides Neonatal Porcine Bacteria, viruses, coccidia	1) Whole animal or 2) See TGE for samples to send or 3) Fresh/frozen ileum	1) Whole animal PM 2) Culture & sens. 3) IFAT, K99, 987P, F41 4) K88-Seroagglutination 5) EM studies on live animal only. 6) Histopathology	Submit a live untreated piglet in the 1st day of scours OR specimens for submission to the lab should be collected from an untreated piglet euthanized in 1st day of scours.
Enteritis Canine Parvovirus Parvovirus	1) Whole animal or 2) Formalized portions of affected intestine and 3) Fresh intestine (tied off) or 4) 10 g feces (formalized 9:1)	1) Histopathology 2) Direct EM if necessary.	Vacc. history (of dog or of dam) is helpful.
Enteropathy, Proliferative (Intestinal Adenomatosis Syndrome) **Campylobacter-like** organism	1) Whole animal or 2) Formalized and fresh portions of affected ileum.	1) Histopathology of the affected areas.	Histopathology on affected intestine is only method of diagnosis.
Epididymitis (Brucella) **Brucella ovis**	Testicles from affected rams. epididymides	Culture & histopathology of affected tissues.	Abortion and neonatal mortality are thought to be caused by the infection. This organism is a potential zoonotic.
Fish Diseases See Special Submissions			
Grass Tetany Complex etiology. Hypo-magnesemia and usually hypocalcemia are the most constant biochemical disturbances.	1) Live animal - serum sample (5 ml). 2) Dead animal - cerebrospinal fluid or **vitreous** humor (5 ml).	Determination of magnesium levels in serum, CSF, or vitreous humour.	CSF collected up to 12 hrs after death can be used. Levels in CSF are higher but better correlated with clinical signs than plasma levels.
Greasy Pig Disease **Staphylococcus hyicus**	1) Whole animal or 2) Fresh & formalized portions of lesions 3) Swab in transport media (Stuart's media).	1) Culture & sens. 2) Histopathology.	

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
I.B.R. bovine Herpesvirus	1) Whole neonate or fetus. 2) Fresh & formalized portions of trachea. 3) Entire respiratory system. 4) Nasal or tracheal washings (20 ml of saline solution).	1) FAT 2) Histopathology 3) Tissue culture viral isolation.	Transportation, forward tracheal in transport media (pgs. 27-29).
Johne's Disease (Paratuberculosis) **Mycobacterium para-tuberculosis**	1) Whole animal or 2) Formalized and fresh portions of affected ileum, caecum, colon or 3) Rectal scrapings/ biopsy.	1) Histopathology 2) Acid fast stain - on fresh and formalized portions and rectal scrapings. 3) Fluorescent test for acid fast organisms.	Fecal samples from live animals are not suitable submissions and will not be processed. Send rectal scrapings.
Keratitis, Infectious Bovine **Moraxella bovis**	Swabs from affected untreated eyes (refer to page 25)	Culture & sens.	Dry eye swabs are unsuitable. When sampling, avoid contamination of swabs.
Keratitis, Infectious Ovine Moraxella **(Branhamella)** ovis	Same as above.	Same as above.	Same as above.
Leptospirosis **Leptospira interrogans** (16 serogroups)	1) Whole animal or 2) Fresh and formalized portions of liver, lung, kidney	1) Histopathology 2) F.A.T. testing	1) Leptospirosis is a zoonotic disease. 2) An animal may be a definite or an accidental host. 3) Samples forwarded outside province (see Bact. sect.)
Listeriosis **Listeria monocytogenes**	1) Brain or affected organs in the septicemic form. 2) Aborted fetus and placenta.	1) Culture 2) Histopathology	Listeriosis is a zoonotic disease.
Malignant Catarrhal Fever Several viruses incriminated (sheep associated disease)	1) Whole animal or 2) Formalized brain and formalized portions of lymph nodes, alimentary tract mucosa, liver, adrenal gland and kidney.	Histopathology.	Disease is often confused with B.V.D.

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Mastitis Bovine Many bacteria, yeasts, fungi	1) Whole animal or 2) Fresh and formalized portions of affected gland or 3) Milk samples (see Bacteriology-Mycology submissions	1) Histopathology 2) Culture & sens.	For herd sampling, phone the bact. section prior to submission. Samples are collected by the veterinarian.
Milk Culture Submissions See Bacteriology			
Mycosis Guttural Pouch **Aspergillus sp.**	1) Whole animal or 2) Head of affected animal	1) Fungal culture 2) Histopathology	A common cause of fatal epistaxis following erosion of the internal carotid artery.
Myofibrillar Hypoplasia Unknown	1) Whole animal or 2) Formalized portions of skeletal muscle.	Histopathology	
Myopathy Nutritional Vitamin E-Se responsive disease	1) Whole animal or 2) Serum (3 ml) or 3) Formalized portions of heart, skeletal muscle and diaphragm.	Serum Selenium and Vitamin E determinations Histopathology Serum enzymes	
Osteodystrophy Nutritional, chemical, inherited, and congenital causes.			Diagnosis will be delayed because of the need to decalcify bones for sectioning.
Parasitic Infections (see Parasitology Subm.)			
Panleukopenia Feline Parvovirus	1) Whole animal or 2) Formalized portions of lymph nodes, spleen, bone marrow and ileum.	Histopathology	Virus produces cerebellar hypoplasia in kittens.

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Parakeratosis Cause probably nutritional. Excess calcium of zinc, and deficiency of unsaturated fatty acid in diet.	1) Whole animal or 2) Biopsy or relative deficiency 3) Portions of affected skin	1) Histopathology	
Pneumonia Bovine Respiratory Disease Many bacterial, viral, parasitic, mycoplasma and dietary etiologies may be involved in the pathogenesis of disease.	1) Whole animal or 2) Entire respiratory tract or 3) Formalized & fresh portions of lung and trachea 4) Sera-paired samples upon request.	1) Histopathology 2) Culture & sens. 3) Viral culture & FAT 4) Baermann digest (lungworm) 5) Serology	
Portions of lung from **all** affected areas should be forwarded for histological examination. This is essential since more than one process may be in progress in the lung at time of death.			
Pneumonia Porcine **Mycoplasma hyopneumoniae** Bacteria Parasites	1) Whole animal or 2) Formalized and fresh portions of affected lung	1) Histopathology 2) Culture & sens. 3) Mycoplasma cultures 4) Baermann digest (lungworm)	Mycoplasma cultures require 2 weeks to complete. FAT protocol on frozen lung is being developed.
Pneumonia Equine Many bacterial, viral and parasitic etiologies.	1) Whole animal or 2) Fresh and formalized portions of lung or 3) Entire respiratory system	1) Histopathology 2) Culture & sens. 3) Viral isolation and FAT 4) Baermann digest (lungworm)	
Pneumonia Ovine Many bacterial, viral and parasitic etiologies.	1) Whole animal or 2) Entire respiratory system or 3) Formalized and fresh portions of affected lung.	1) Histopathology 2) Culture & sens. 3) Baermann digest (lungworm) 4) Chlamydia culture and FAT.	
Polioencaphalomalacia Cause not completely understood. Thiamine inadequacy associated with the disease.	Brain - half fresh and half formalized.	Histopathology Woods Lamp examination	Split brain sagittally-send half in formalin and half of the brain fresh for possible culturing. Cross sections of affected brains fluoresce with U.V. light.

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Porcine Polyserositis (Glasser's Disease)			
Hemophilus suis Hemophilus parasuis	1) Whole animal or 2) Swabs from affected serous membranes-fluid in teansport media or 3) Fresh and formalized portions of affected organs.	1) Histopathology 2) Culture & sens. 3) Mycoplasma cultures	
Hemophilus organisms have special growth requirements. Mycoplasma cultures are for **M. hyorhinis** only.			
Porcine Stress Syndrome			
Susceptibility inherited as a single recessive gene.	Whole animal	Gross PM exam Histopathology Muscle pH Culture	Histopathology and muscle pH may support diagnosis in some cases but are not diagnostic. Gross, microscopic and bacteriological exams are used to rule out other diseases.
Protozoa (other than coccidia)			
Toxoplasma Neospora	1. Whole animal or 2) Formalized portions of brain, liver, lung, lymph nodes, intestine, pancreas, eye, myocardium and placenta.	Histopathology	Toxoplasmosis is a zoonotic disease.
Rhinopneumonitis Equine			
Equine Herpesvirus I	1) Whole animal or 2) Aborted fetus or 3) Fresh and formalized portions of affected lung, liver and brain.	Histopathology Culture & sens. Viral isolation and FAT	
Salmonellosis			
Approx. 2200 Salmonella serotypes identified.	1) Whole animal or 2) Fresh and formalized portions of ileum, colon, liver, mesenteric lymph nodes & spleen 3) Blood cultures from septicemic live animals (see pg. 20)	Culture & sens. Histopathology	Salmonellosis is a zoonotic disease. Serotyping is done at the Public Health Laboratory, Vancouver. **S. dublin** infection in cattle is rarely diagnosed by fecal culture (requires a blood culture).
Scours See Enteritides			

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Septicemias, Bacterial Many bacterial species	1) Whole animal or 2) Fresh and formalized portions of lung, heart, liver, kidney and spleen.	1) Culture & sens. 2) Histopathology	
Actinobacillus (Shigellosis) **Actinobacillus equuli**	1) Whole animal or 2) Fresh and formalized portions of liver, kidney and intestine or 3) Swabs from affected organs and joint fluid in transport media.	Culture & sens. Histopathology	
Streptothricosis (See Bacteriology/ Mycology Subm.) Streptothricosis is a zoonotic disease.			
Swine Dysentery **Treponema hyodysenteriae**	1) Whole animal or 2) Fresh and formalized portions of the colon.	1) Hiistopathology 2) Direct smear examination of affected organs 3) Culture of organism	Preliminary results are available at 2 days from a colonic impression smear. Organism may be cultured if requested (requires 1 week).
Toxicology Submissions (See Toxicology)			
Transmissible Gastroenteritis (T.G.E.) Coronavirus	1) Live sick untreated piglet on first day of scouring or 2) Intestine content 3) Fresh jejunum - 15 cm 4) Formalized portions of duodenum, jejunum and ileum.	Histopathology EM Indirect FAT Serology submissions.	Extensively treated autolytic animals and tissues are unsuitable
Tuberculosis **Mycobacterium bovis** **Mycobacterium avium** **Mycobacterium tuberculosis** Atypical mycobacteria	1) Whole bird or animal or 2) Formalized portions of affected organs	Histopathology Acid fast stain	T.B. is a zoonotic disease and a Federal Reportable Disease.

Disease - Cond. & Causal Agent	Specimen Requirement	Examinations Performed by the Laboratory	Special Comments
Tularemia **Francisella tularensis**	1) Whole animal or 2) Formalized and fresh portions of liver, spleen, lymph nodes.	Histopathology Culture	Tularemia is a zoonotic disease. Organism takes one week to grow.
Tympanites Primary (Bovine Bloat) Dietary factors	Whole animal	Gross examination.	Commonly confused with other causes of "sudden death" in cattle. Important to differentiate primary from secondary bloat.
Virology Submissions (See Virology)			

Notes

Fee Schedule - General Policy

The fee schedule varies depending on the type and origin of the submission.

In general production animal fees are heavily subsidized, whereas those pertaining to companion animals reflect more closely the actual laboratory cost.

Production animals

Production animals include cattle, sheep, goats, swine, horses, game farmed animals, farmed fur animals, farmed fish, commercial meat rabbits and avian species commercially farmed for meat or egg production.

Companion animals

Companion animals include those not listed above such as dogs (except seeing-eye dogs), cats and exotic animals not kept primarily for food production.

Submission

A submission can consist of more than one specimen for which one fee is charged, provided that the specimens come from the same group or age group and must be from one specific disease problem and belong to the same owner.

A maximum of three mammals, five birds or five fish is the rule for each submission - exceptions may be made in the case of chicks, poults, fish or eggs or, at the request of the pathologist, call the Animal Health Centre.

Special Fees

These are specific samples for specific tests which do not form part of a larger submission. Examples are milk samples for bacteriology or serum samples for serology.

Fee Payment

Fee calculation is made on the type and number of procedures required to arrive at a diagnosis or conclusion. The number and type of procedures required is at the **discretion of the pathologist**. Fees will be calculated on an individual basis and invoiced.

Fees for companion animals are on a **cash only basis** at the time of submission except where a prior arrangement has been made to set up an account - this is for regular clients only.

Goods and Services Tax

Laboratory submissions are subject to the G.S.T. The administration fee is non-taxable.

Animal Health Monitoring Laboratory

Specimens for tests identified as being done at the AHML should be submitted directly to that laboratory. Cheques should be made out to the Animal Health Monitoring Laboratory or AHM Laboratory.

Tests at Other Laboratories

If tests require the use of other laboratories, this cost may be added - there is no maximum fee in this case. Permission will be obtained from the submitter before the samples are forwarded.

Refusal of Specimens/Results

We retain the right to refuse to accept specimens or to divulge laboratory results until a fee is paid.

Specific results will not be given to a third party without the permission of the submitter or other person named on the submission sheet to receive these results; the results are considered confidential. Exceptions to this are where a notifiable disease (a named disease under the federal or provincial Acts in disease control) is detected or by a court subpoena.

The results may, however, be used for statistics or similar purposes without their source being identified.

Comments

We are always pleased to receive your comments and will act on them if at all possible.

Fee Schedule
Animal Health Centre

Effective January 2, 1991

All submissions are subject to an Administration Fee of $15.00.
Costs for additional testing procedures are added to this Administration Fee.
For Companion Animals the all-inclusive fee of $95.00 is charged for Postmortem Examination.

	Food and Production Animals	Companion Animals
Postmortem Examination	**$10.00**	**$80.00**
Bacteriology	15.00	30.00
Histopathology	5.00	15.00
Virology	10.00	20.00
Parasitology	5.00	-
Tissue Mineral Analysis	5.00	-
Fish (Complete Workup)	15.00	15.00
Maximum Total Charge (Incl. Admin. Fee) for above tests	**$50.00***	**$95.00**

* Documentation for insurance purposes, other than cause of death, will be subject to an additional $50.00 levy.

* Removal of spinal cord or examination of spinal column in horses, will be subject to an additional $50.00 levy.

Tests performed will be at the discretion of the pathologist based upon the history and specimens submitted.

Maximum of 3 mammals, 5 birds or 5 fish of the same general age, same group and same apparent disease problem, per submission.

Food and production animals include cattle, swine, sheep, working horses, fallow deer, bison, reindeer, goats, fur producing animals, rabbits raised for meat, farmed fish, and birds kept for meat or egg production.

Companion animals include dogs (except seeing eye dogs), cats, leisure horses and other species not primarily kept for food production. Companion animal submissions are accepted on a cash only basis.

Special Fees

Administration Fee ($15.00)
Plus:

HISTOLOGY		Complete Blood Count	$ 5.00/sample
TOXICOLOGY	**Serum:**	Total Mineral Package (includes selenium, copper, manganese, iodine, iron, zinc, calcium, magnesium, phosphorus)	$3.00/sample
		Selenium Only	$ 2.00/sample
		Calcium, Phosphorus, Magnesium	$2.00/sample
		Blood Urea Nitrogen (BUN)	$ 2.00/sample
	Other:	Vitamins A and E	$ 5.00/sample
		Monensin or other Feed Additives	$10.00/sample
		Strychnine or Metaldehyde	$10.00/sample
		Anticoagulant Rodenticides	$10.00/sample
		Nitrates	$ 5.00/sample
		Feed: Urea	$10.00/sample
BACTERIOLOGY		Milk Samples 1 - 4 samples 5 - 12 samples	$10.00 $20.00
SEROLOGY		$2.00 per antigen per sample Incl. Lepto, Salmonella, IgG/IgM (1 test), TGE	

Please contact Laboratory (854-4400) for other charges

****All prices subject to 7% G.S.T. (Administration Fee is non-taxable)**

Samples for complete feed analysis should be forwarded to Griffin Laboratory in Kelowna.

Kits for water analysis may be picked up the AHC free of charge. When water samples are collected they can be forwarded directly to Zenon Laboratory in Burnaby.

Fee Schedule
Animal Health Monitoring Laboratory

Agriculture and Food Centre
32916 Marshall Road
Abbotsford, B.C.
V2S 1K2

Telephone: 852-5350
Facsimile: 852-5394

This laboratory now offers tests that local veterinarians may be interested in. Staff have recently been "accredited for EIA testing" by Agriculture Canada and trained as well in serology for EBL (Enzootic Bovine Leukosis). There are also tests available for sulfamethazine residues (blood or urine) and mycotoxins in feed samples. With sufficient demand to stock the test kits, turn-around time on these tests would be 48 hours.

Costs:	EIA (Coggins) Serology *	$11.00/test for 6 or less $ 9.00/test for more than 6
	EBL Serology	$ 9.00/test for 6 or less $ 7.00/test for more than 6 $ 3.50/test for 18 or more
	CAE Serology	$ 3.00/test
	Sulfamethazine Aflatoxin	$ 8.00/test, $6.50/test if more than 6 $15.00/test, $6.50/test if more than 6
	Zearalenone} T2 Toxin } Vomitoxin }	$20.00/test, $17.00/test if more than 6
	All Poultry Serology	$ 2.25/test, plus $15.00 administration fee to the Animal Health Centre.
Receiving Hours:		8:30 - 11:30 a.m. and 1:00 - 4:00 p.m.
Questions:		Call Letitia Curley or Roberta Yemen at 852-5350.

* For EIA, please be sure you have the correct Agriculture Canada forms filled out; we cannot accept the bloods without them.

Poultry bloods (except those under the Broiler Monitoring Program) should be delivered to the Animal Health Centre. All other samples for tests above should be delivered direct to the Monitoring Laboratory.